# The DENTAL DIGEST


DECEMBER, 1934
Vol. 40 No. 12

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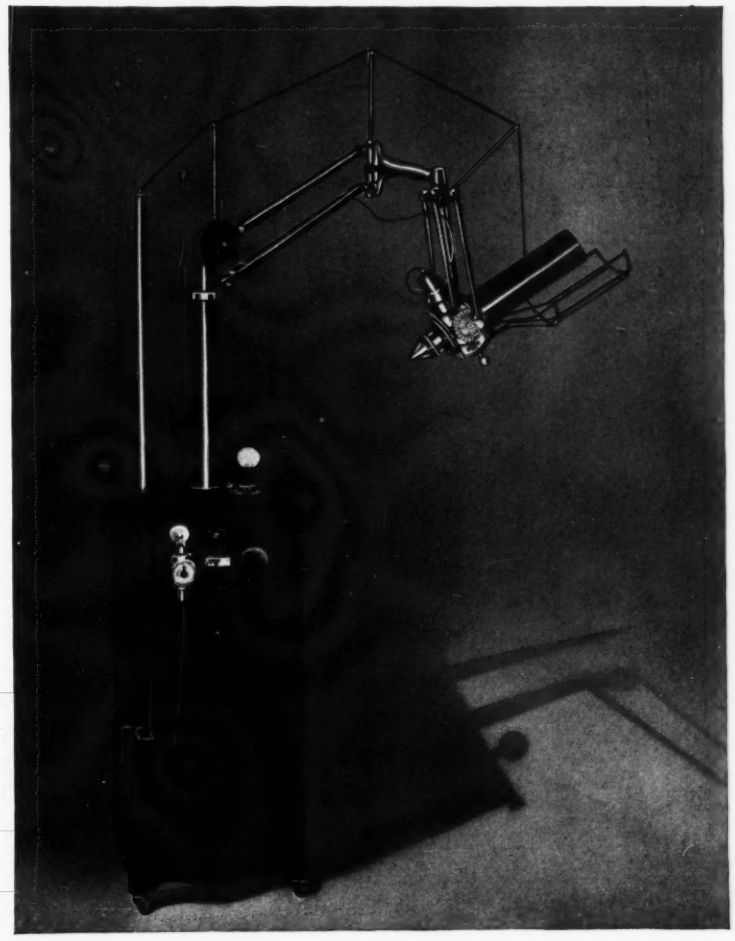

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# THE EDUCATION OF THE DENTAL PATIENT

## IV. THE DEVELOPMENT OF ROOT-END INFECTIONS *

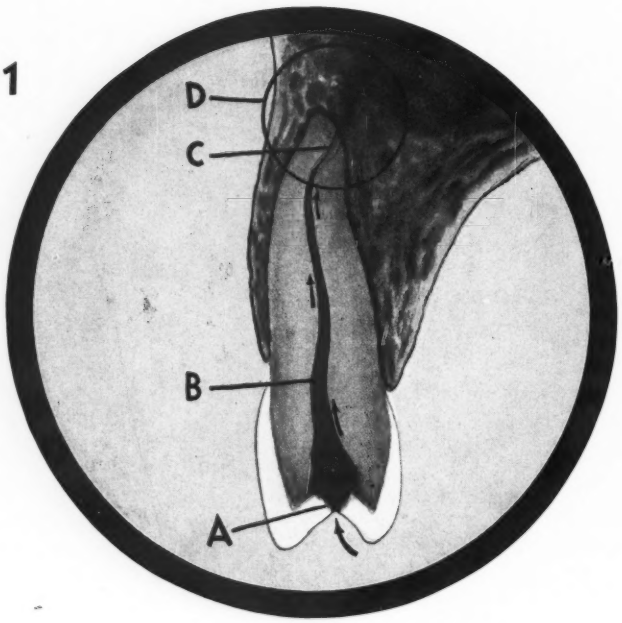



Fig. 1—A = Deep cavity in a tooth (site of bacteria).
B = Beginning inflammation in pulp (nerve) of tooth progressing toward the root-end.
C = Normal pulp tissue at root-end.
D = The circumscribed zone is the area shown under high power magnification in Figs. 2, 3, and 4.

Fig. 2—E = Bacteria traveling from cavity and beginning to appear near root-end.

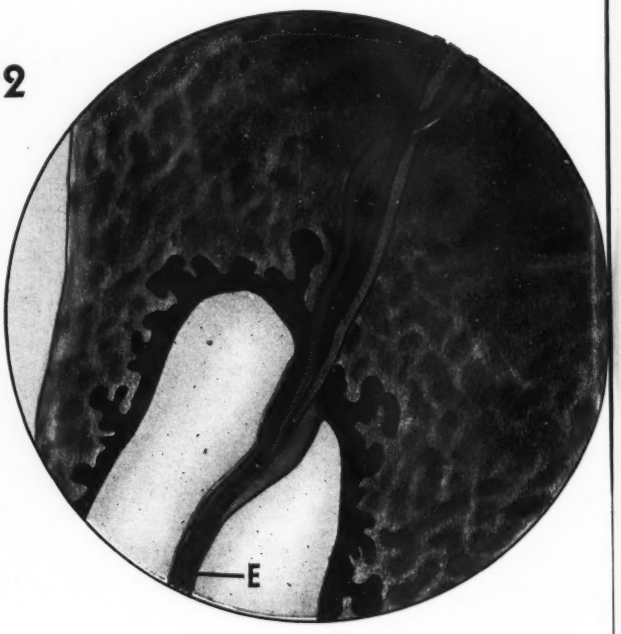
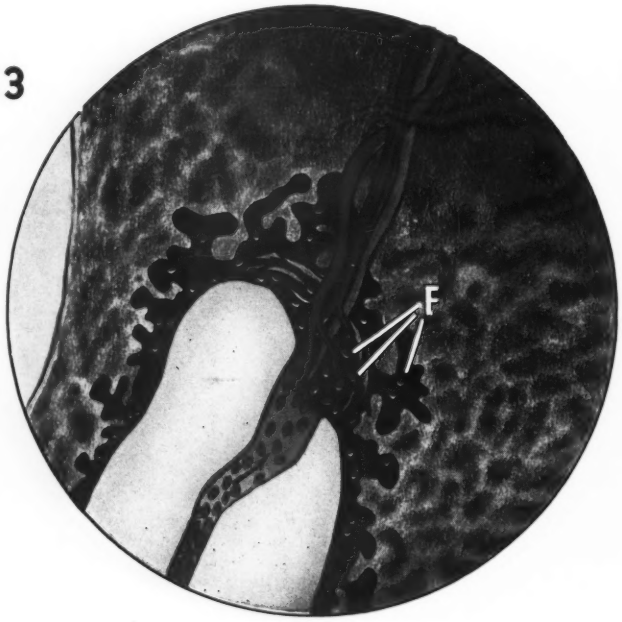
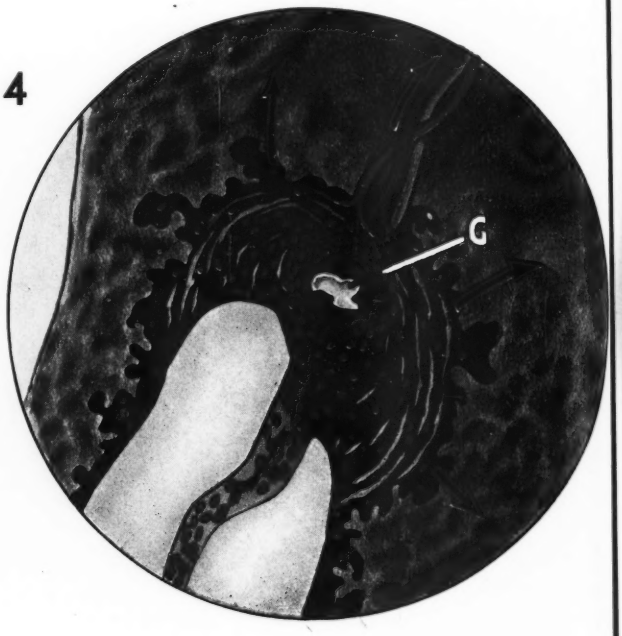



Fig. 3—F = Bacteria and toxins being forced through opening in tooth root; the bone surrounding the root-end is beginning to be destroyed. Infection is developing.

Fig. 4—An extensive infection has developed at the root-end with bone destruction (the enlarging dark area). G = Pus formation. From such a focus of infection bacteria and their toxins may enter the blood stream to be carried to other parts of the body and there establish secondary infection.




* This is number four in the second series of charts intended for the use of the dentist in explaining important normal and pathologic dental conditions to his patients. The first series has been published in booklet form.

# The DENTAL DIGEST

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EDWARD J. RYAN, B. S., D. D. S., Editor

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# IMMEDIATE DENTURES FOR THE AVERAGE DENTIST

AMOS G. STIKER, D.D.S.

## "FITTING THE MOUTH TO THE DENTURE"

*Technique by*
AMOS G. STIKER, D.D.S.
ADDISON, NEW YORK

*Drawings by*
LAWRENCE A. ROOT, D.D.S.
WESTFIELD, PENNSYLVANIA

*Photography by*
RALPH B. DYKINS
ADDISON, NEW YORK

*Arrangement by*
MELVILLE STEINFELS
CHICAGO, ILLINOIS

Fig. 1—The average dentist will register the original profile.

Fig. 2—Appearance before extraction.

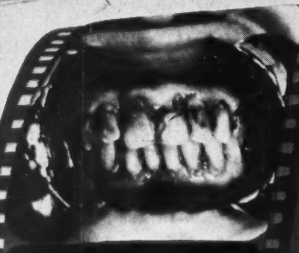


Fig. 3—Chronic gingivitis is no impediment.

## *Impressions*

Fig. 4—Snap impression in soft wax. Counter wax is ideal for this purpose.

Figs. 4 through 11 are of another case.

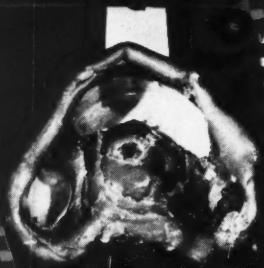


Fig. 5—Cut away wax except at periphery.

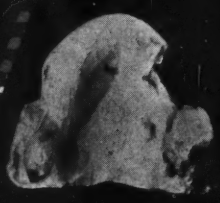


Fig. 6—Pour the model.

Fig. 7—Base plate makes a tray that can be broken to permit removal. Line it with tin foil.

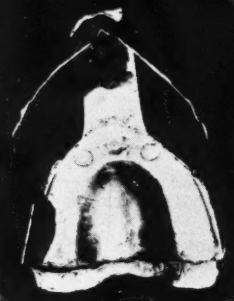


Fig. 8—Perhaps you prefer to cut the front from a metal tray.

Fig. 9—And fit a new removable front close at the periphery.


Fig. 10—With either tray, make an impression like this. Its thin edge will not distort the soft tissues.

Fig. 11—Do not try to use pressions like these. The impres of the teeth is not so importan the periphery must be accura

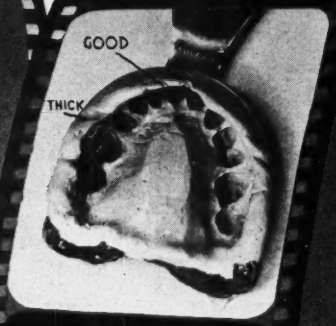



Fig. 12—An elastic impression material, mixed thick, and massaged to place results in fine work without the need to worry about pits.

All succeeding pictures are of the case shown in Figs. 1 through 3.

Fig. 13—Postdamming was damning until the shellac base-plate material try-in came. Mouth mirror and indelible pencil will tell where to use the Kingsley scraper on the model.

Fig. 14—Face-bow mounting permits the bite to be opened in the laboratory. Art often demands such action.

Fig. 15—Ready for the laboratory.

*Trimming the model*

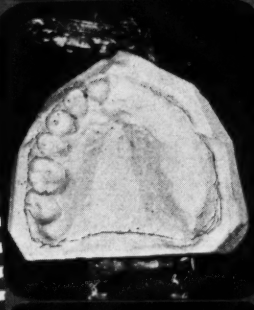


Fig. 16—Cut away teeth on one side and shape ridge as desired.

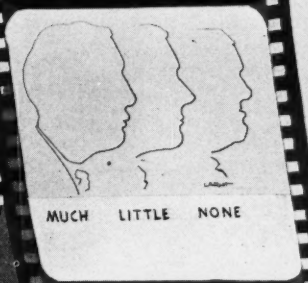



Fig. 17—How much alveolectomy?


Fig. 18—How much alveolectomy?

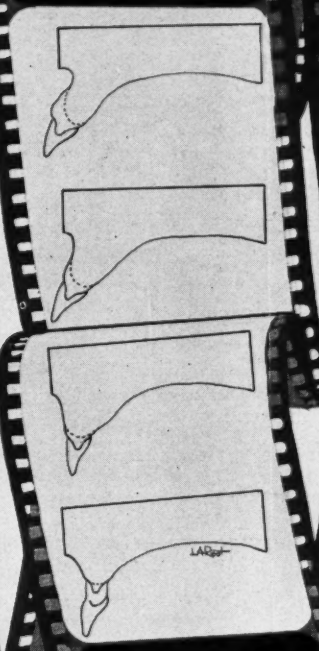


Fig. 19—Outline of the tissues after alveolectomy.

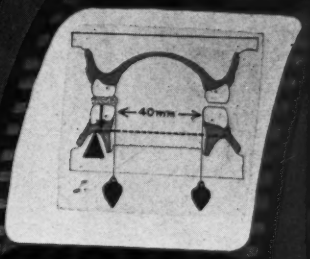



Fig. 20—The teeth must be set so as to stabilize the dentures.

—*Diagram by Hugh W. MacMillan, D.D.S., M.D. (J.A.D.A. 18:1032 [June] 1931.*

Fig. 21—Setting up is easy.

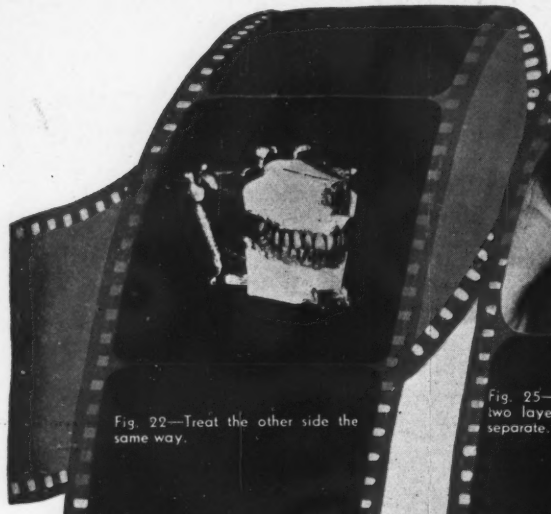


Fig. 22—Treat the other side the same way.

Fig. 23—The hinge type articulator is not so good but may be used if economic conditions demand it.

Fig. 24—The denture has been finished and oiled, and stone has been poured into it. Remove the model.

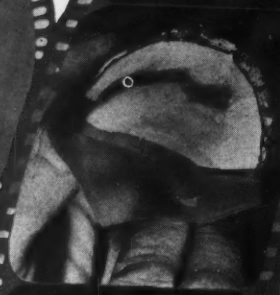


Fig. 25—Cover with thin wax o two layers of tin foil, flask, and separate.

*Making the celluloid trial plate*


Fig. 26—Press .03 inch clear celluloid to shape in flask press while boiling—

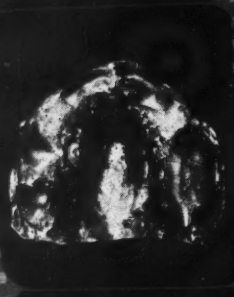


Fig. 27—To produce a transparent replica of the palatal side of the denture. Leave this in the flask until needed.

Fig. 28—Appearance at 1:30 P. M.


Fig. 29—After procaine hydrochloride injection.

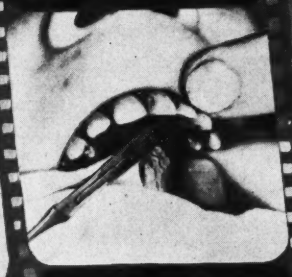


Fig. 30—Remove palatal interdental gingivae.

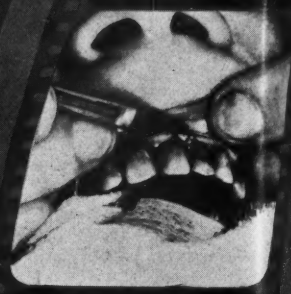


Fig. 31—Incise gum tissue through to the bone where alveolectomy i to be done.

Fig. 32—Remove gum tissue below the incision.

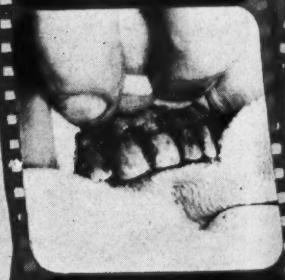


Fig. 33—Elevate mucosa and periosteum with sharp periosteotome to expose at least the marginal ridge.


Fig. 34—With sharp chisels remove necessary bone, usually only the alveolar crest.
Fig. 35—After extraction, do not leave a mess like this, with rough edges. Coapt tissues with fingers. Sutures are almost never needed.
Using the celluloid trial plate
USE RONGEUR HERE
Fig. 36—Remove napkins from mouth and press home the celluloid trial plate. (See Fig. 27.) When tissues blanch, bone must be removed or the denture trimmed.
Fig. 37—When there are no high spots, the denture will go to place.
Fig. 38—The average dentist may wish to deceive.
Fig. 39—But Mrs. Average Patient has her own ideas.
Fig. 40—The roentgenographic cut-out templet fitted before extraction.
Fig. 41—With the denture in place, it still fits. Try it on and show the patient before the face swells, as it may on the morrow.
Fig. 42—At 2.30 P. M. she smiles
Fig. 43—Her teeth occlude.
The End.

# FRACTURE OF THE MANDIBLE COMPLICATED WITH OSTEOMYELITIS

REUBIN SELDIN, D.D.S.
New York

## REPORT OF CASE

*History*—G. M., a well nourished man, aged 26, 5 feet, 7 inches tall, weighing 165 pounds, received a blow from a fist on the right side of the face on March 18, 1932. He went to his physician who had roentgenograms taken of the mandibular and maxillary bones. The report of the roentgen examination read, "A complete vertical fracture of the left side of the mandible in the bicuspid region. The line of fracture runs between the first and second bicuspid and through the mental foramen. No displacement was evident nor was there evidence of fracture of any other bones of the face."

The patient had received no treatment other than a Barton bandage which had been kept in place for six days. He had been advised not to bite hard things and was dismissed as "cured." Later the patient developed a pain in the jaw in the region of the left bicuspids, and was told to consult a dentist.

*Examination*—Mr. G. M. presented himself at my office on March 29, 1932. The patient had a hard swelling externally on the left side, at about the lower border of the ramus of the mandible. Examination of the mouth showed a false point of motion between the bicuspid teeth. The soft tissue between the bicuspids was lacerated buccally and lingually. A vitality test showed the two bicuspids in question to be vital. Movement of the broken ends of the mandible caused a serous discharge from the lacerated tissue. The upper and lower first molar and first bicuspid of both sides were banded with orthodontic bands.

*Treatment*—After the bands were cemented into place, the upper and lower bands were wired together with stainless steel ligature wire. The patient was instructed to keep his mouth as clean as possible by frequent washing and spraying with an atomizer. A mouth wash was prescribed, and the patient was instructed to apply an ice bag to the external swelling for twenty minutes every hour.

A liquid diet, as suggested by Doctor Ivy, was also prescribed; in addition, Viosterol, 5 drops, three times daily and calcium gluconate, 10 grains, three times daily were prescribed.

*Course*—The patient was seen the following day. His appetite was good, the pain was a little better, and the swelling was softer.

The mouth was thoroughly sprayed with a mild antiseptic, and a medicinal dye was applied to the lacerated tissue in the mouth.

The patient was seen daily for washing and inspection of the bands and wires.

The lower left band loosened in a few days and was replaced by wires around the first and second molars with a loop between these teeth for the intermaxillary wires.

*Operation*—On March 4, the external swelling was sufficiently pointed to indicate external incision and drainage. The intermaxillary wires were removed, nitrous oxide oxygen was administered, and a half inch incision was made at the lowest point of fluctuation. A quantity of greenish-yellow pus was obtained. A probe passed through the incision was easily passed into the mouth through the lacerated tissue between the bicuspids. A rubber drain was inserted and a sterile dressing applied over the incision.

*Postoperative Course*—The following day the drain was removed, the wound was irrigated with a mild antiseptic solution.

The drain was changed and the wound irrigated daily for the next eight weeks. Roentgenograms were taken weekly to observe the progress of the osteomyelitic process.

On April 11, all the lower bands were removed and an arch wire was constructed, similar to Doctor Winter's splint. This arch wire was inserted to keep open the space where bone had been destroyed by the osteomyelitic process, and to prevent a collapse of the lower arch. Intermaxillary wires were applied from the arch wire to the upper bands. Pus was still flowing from the external incision.

*Second Incision*—On June 7, the patient was again anesthetized with nitrous oxide oxygen, the incision was made slightly larger, and the sequestra removed. A drain was inserted as previously.

*Course*—June 11, the drains were discontinued, as there no longer was any flow of pus. The incision was allowed to close. The patient was now coming to the office twice weekly to have the mouth cleaned. A slight discharge was still exuding into the mouth from between the bicuspids. The intermaxillary wires were discontinued and only the arch wire was retained. The patient was permitted to add semisolid foods to his diet.

October 10, the arch wire was removed, and the patient was requested to return monthly for further roentgenograms.

The patient was at no time more than 5 pounds below his usual weight. During the first two weeks of treatment, the patient did lose some weight, but after he became accustomed to having his jaws wired and to having the liquid diet, he quickly regained the lost weight.

Fig. 1—A 5 by 7 lateral roentgenogram was taken which showed the beginning of osteomyelitis in the line of fracture.

Fig. 2—March 6, another lateral roentgenogram was taken which more definitely established the diagnosis of osteomyelitis in the line of fracture.

Fig. 3—March 14, a roentgenogram showed the beginning of the bone sequestra.

Fig. 4—March 20. Some of the smaller sequestra between the two bicuspids had been either dissolved or thrown off into the oral cavity in the time intervening between this roentgenogram and the previous one.

Fig. 5—March 27. Two larger pieces of sequestra are seen below, where the mental foramen was, and a smaller bit above and between the bicuspids. The beginning of callus formation may be observed in the region where the mental foramen should be.

Fig. 6—April 11, a roentgenogram showed sequestra still in place. The first bicuspid looks questionable. Vitality tests showed this bicuspid still to be vital, and it was retained.

Fig. 7—June 2, the roentgenogram showed the larger sequestrum still present. The marker was inserted into the external incision, to localize the sequestrum. New bone may be observed to be forming in the region of the mental foramen. The first bicuspid looks better in this film.

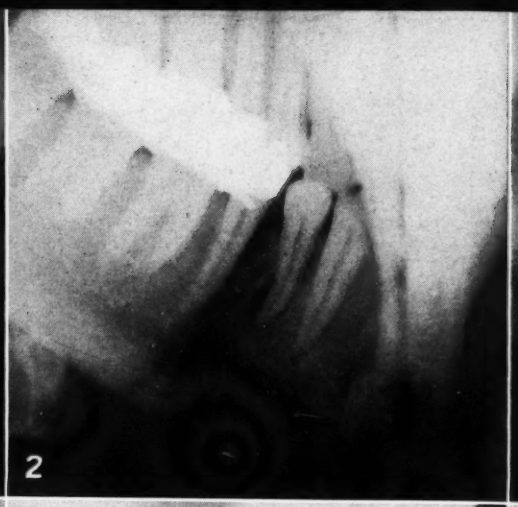
Fig. 8—June 8, the roentgenogram showed the sequestrum entirely gone, except for a tiny sliver between the bicuspids. New bone is seen to be filled in considerably about the mental foramen.

Fig. 9—June 29. Further regeneration in the line of fracture.

Fig. 10—September 7. Further regeneration of bone. A new mental foramen has been formed. At this date the patient was permitted to add solid foods within reason to the diet.

Fig. 11—September 29. Further bone regeneration. New bone had been formed between the bicuspids more than half way up the roots.

Fig. 12—November 21. Almost complete regeneration of the bone destroyed by the osteomyelitis.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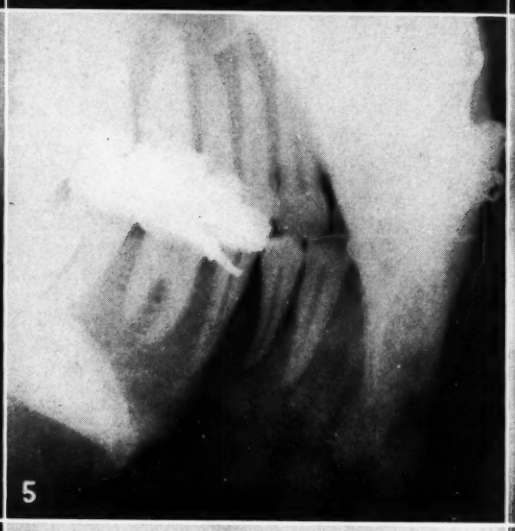
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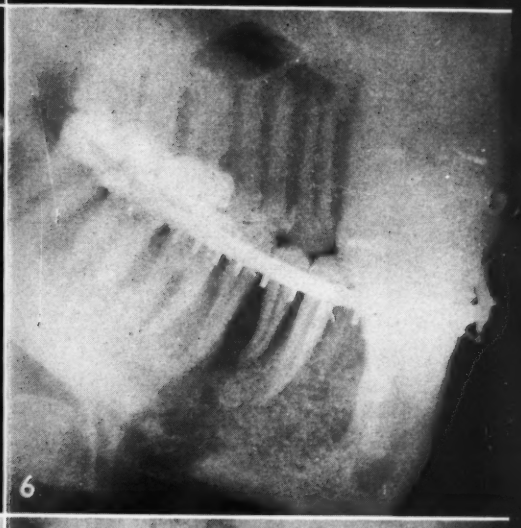
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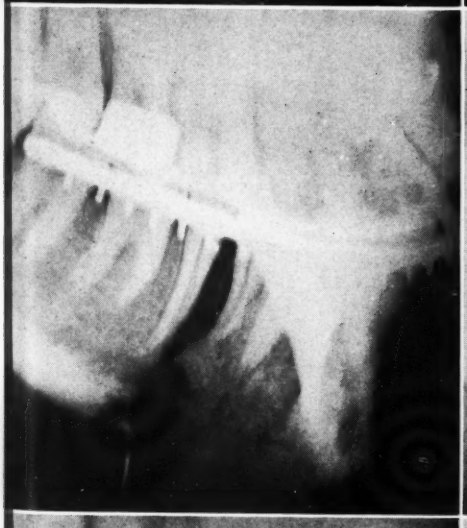


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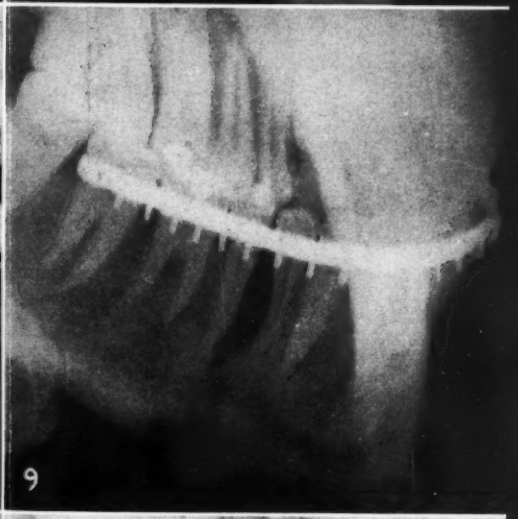
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11


12

Vitality tests in January showed the bicuspids to be vital.

### Comment

It will be observed in this report that three types of fixations were used: (1) orthodontic bands, (2) wire loop, and (3) metal splint. The orthodontic bands were not satisfactory. Aside from the difficulty involved in making them, they loosened repeatedly and gave way under the stress caused by the intermaxillary wires.

The loop method, as suggested by Ivy, was satisfactory. The loops were easily applied and did not give to any appreciable extent when the intermaxillary wires were tightened.

The metal splint proved to be of great advantage in maintaining the space caused by the destruction of bone as a result of the osteomyelitis, and after sequestration had been complete, and callus formation and new bone formation had begun, the splint served to keep the parts fixed without resorting to intermaxillary wiring. This afforded a greater degree of comfort to the patient. He was able to clean his teeth and keep his mouth in a much cleaner condition than when the jaws were fixed. After having had his jaws wired together for the number of weeks that he did, opening the mouth and closing it again at will was to him a great pleasure. Eating became a much simpler affair; semisolid foods were permitted in conjunction with the liquid diet he had to subsist on when the intermaxillary wires were in place.

Chanin Building.

Fig. 13—January 13, 1933. Complete regeneration of the lower border of the mandible and regeneration of the interproximal septum between the bicuspids, half way up the root of the first bicuspid and two-thirds the way up the root of the second bicuspid.

## LETTERS TO THE EDITOR

### Biomechanics

If there is anything certain in this world of puzzling and conflicting hypotheses, it would appear that no one factor ever caused anything in health or disease. This preamble concerns your editorial (September, 1934) in The Dental Digest, and specifically the latter part of the first paragraph.

Now I claim, with some justification from experience of the mass-man mentality, that many readers will deduce from the first paragraph that metabolism is the one and only factor in dental disease worthy of consideration. I beg to state most emphatically, such a thought is too inhibited in scope, and, in fact, inaccurate.

To use a homely, if logical, analogy between the dental organism and any kind of a mechanism: I ask you if it is sufficient for health and function merely to *build* your machine. You will admit that the *upkeep* of any machine entails alinement of parts for smooth working, and also, cleaning and lubrication thereof! Hence, I implore the use of language, which can in no wise be interpreted to encourage, even by inference, a neglect of mouth cleanliness. Because it will not do in this civilization.—E. Melville Quinby, D.M.D., *Boston, Mass.*

In the second installment to this editorial (October, 1934) appears the statement that "dentistry is a biomechanical science and art," which was intended to impress upon our readers the fact that the laws of mechanics as well as the laws of biology play an important part. The upkeep of the dental machine is certainly as important to insure proper functioning as the upkeep of any other mechanical unit. Perhaps we should not have waited until the second installment to convey this impression.

—Editor.

### Canal Filling in Apicoectomy

Concerning Doctor Hillel Feldman's article in your August, 1934, issue, I have found that although the method he advocates is efficient, it does not meet all the requirements for that type of case. The method I have found more practical and convenient is one that saves unnecessary treatments and visits when the apicoectomy is to be referred to a specialist.

In the case of an anterior cyst in which its removal had to involve an apicoectomy, working in conjunction with Doctor J. Schroff, we decided to do the root canal therapy first. On opening into the canal, I found a thin serous fluid which could not be controlled by any known method.

A tapered silver wire was made by turning on the lathe. This wire was inserted into the canal and a roentgenogram taken. The wire was then removed and that portion was cut off that would stopper the opening and yet be well in that portion of the apex that was to be removed. The small silver cone was next jammed into the apex with root canal pluggers. Unhampered, we could then proceed with the cleaning and filling of the remainder of the canal.

The disadvantages of cutting off a part of the apex before filling the canal are that some of the blood may dry up in the canal; that it is difficult to sterilize a wide open canal to its end; that it is almost impossible properly to condense the gutta-percha cones into a canal with almost parallel walls, such as is left after the removal of the apex.—Gilbert Mittleman, D.D.S., *New York, N. Y.*

### Adolescent Gingivitis

In the August, 1934, issue of The Dental Digest (page 271), you have a fairly satisfactory answer to Adolescent Gingivitis.

For some time now, dentists have been reading about vitamin deficiencies. From the case report, I should judge that this is a case of avitaminosis. The dentist definitely states that the patient eats "a great deal of rice." Since the patient also has freely bleeding gums, it seems wise to lean toward a diagnosis of vitamin deficiency.

Why not prescribe a blood test which would include a chemical analysis of the blood, a differential blood count, and a determination of the hemoglobin content? Why treat a case symptomatically?—Harry Roth, D.D.S., *New York, N. Y.*

# THE DENTIST AND TUBERCULOSIS*

HAROLD S. HATCH, M.D.
Morristown, New Jersey

DURING recent years the relationship of dental defects to many problems encountered by the internist has come to be generally recognized. The importance of the subject seems to warrant a discussion of this relationship to an important branch of internal medicine, and the purpose of this article is to point out some of the valuable aids that the dentist may bring to the physician in the diagnosis and treatment of tuberculosis.

Many of the symptoms of beginning tuberculosis are of toxic origin, and consist of fatigue, low grade fever, and loss of weight. These symptoms may be due to focal infection anywhere, and often originate from infected paranasal sinuses, infected teeth, diseased tonsils, gallbladder or pelvic organs, as well as from early tuberculosis; hence, in many patients when the diagnosis is obscure, the physician finds it important to rule out possible foci of infection outside the chest. It frequently happens that the teeth are the focus from which these symptoms come, and the relatively simple procedure of tooth extraction soon relieves the condition.

I recall two cases in which the extraction of abscessed teeth caused the disappearance of apical râles in the lung.

One of these patients was a young woman who had lost 15 pounds, complained of considerable fatigue, and had a persistent rise in temperature in the afternoon, ranging from 99.6 to 100° F. Examination of the chest revealed the presence of persistent rales at the apex of the right lung, above the clavicle. These symptoms and physical observations seemed to warrant a tentative diagnosis of pulmonary tuberculosis, and the patient was therefore admitted to the sanatorium. During her routine dental examination, roentgenograms were taken of the teeth and two abscessed roots were discovered. These teeth were extracted. Within three days, the fever subsided, the patient felt much better, and soon regained her lost weight. Most significant of all, the rales at the right apex disappeared, and have not returned although this patient has been kept under observation for the last five years.

We have seen another case, the history of which is similar to the case described, in which physical signs in the lung cleared up following the extraction of abscessed teeth. The outcome in these cases convinced us that the lung disorders and symptoms were not due to tuberculosis.

In treatment no less than in diagnosis the aid of the dentist often proves invaluable.

Most tuberculous persons have poor teeth, and few of them fail to show disorder. There are probably several causes that account for this. Lack of care is, of course, often a factor, as is also the malnutrition so often accompanying the disease. While a great deal still remains to be learned regarding calcium metabolism in the tuberculous, there is considerable reason to believe that it is disturbed, and this is possibly a factor in the dental caries so often present.

Altogether too frequently the physician who finds a tuberculous lesion in his patient, seeks no further for other defects which may be present, but is content to treat his patient for tuberculosis alone. It is well to remember that even though a patient has tuberculosis, he may still suffer from other conditions which, if discovered, may perhaps easily be corrected. Thus relieved, he will then be in a much better position to combat the tuberculosis.

A case in point is that of a middle-aged woman with proved pulmonary tuberculosis, in the moderately advanced stage. For many months there was an afternoon fever of 100° F. Although the patient was kept constantly in bed, this fever did not subside. She did, however, gain considerable weight, the cough improved, and the expectoration decreased. Finally attention was directed to her teeth, and the roentgenogram showed the presence of an abscessed molar. Following its extraction, the fever subsided, and the disease eventually became arrested.

Most physicians specializing in the treatment of this disease have come to recognize the importance of restoring the teeth of their patients to good condition at the outset of treatment. In all well conducted sanatoriums at the present time, a dental department is maintained, and is an important part of the institution. Here the teeth are carefully examined and put in good condition during the early part of the patient's institutional residence, and are thereafter reexamined at regular intervals, prophylactic treatments given when necessary, and beginning defects corrected. The benefits resulting from this work have made most physicians engaged in sanatoriums enthusiastic. Often the removal of carious roots, the cleaning of the teeth, and the restoration of teeth cause obstinate digestive disturbances to disappear. Of course, the tuberculous are prone to have impaired digestion, and it is not believed that dental attention will correct all these disorders, but it does frequently occur. Moreover, these attentions to the teeth often result in an improved appetite.

## The Recognition of Beginning Tuberculosis

Since the dentist, in his professional associations, frequently has confided to him the various symptoms that may be noticed by his patient, it is well that he know something of the significance of those symptoms that may accompany beginning tuberculosis. This is a disease so protean in its manifestations that there is no single symptom or group of symptoms that invariably spells its presence; however, there are certain symptoms that should suggest the disease, and thus enable the dentist to advise the patient that he have a careful investigation made by his family physician.

### Symptoms

*Fatigue*—Loss of strength, lack of endurance, or undue fatigue, often not relieved by usual rest, is the most common symptom of early tuberculosis. Overwork, lack of proper nutrition, excess of various kinds, and especially intercurrent diseases, such as influenza, often lead the patient to complain of an unwonted feeling of fatigue, a "run-down" or an "all-in" feeling. Such obscure or unexplained fatigue should always suggest tuberculosis.

*Cough and Expectoration*—There is no particular kind of cough or expectoration characteristic of tuberculosis, but these symptoms persisting for six weeks or longer suggest pulmonary tuberculosis. The sputum should be examined two or more times in such cases.

*This article was written specifically for THE DENTAL DIGEST through the cooperation of the National Tuberculosis Association, New York. The report of the Committee on Diagnostic Standards of the National Tuberculosis Association was freely drawn on in the preparation of this article.

*Pain in the Chest*: *Pleurisy*—Pain in the chest is not always indicative of pulmonary tuberculosis, although it perhaps occurs most frequently in this disease. Pain aggravated by deep breathing suggests the possibility of tuberculosis. Pleurisy with effusion or "water on the lung" is usually due to tuberculosis except in those cases in which it occurs during the course of pneumonia.

*Hemoptysis*—Hemoptysis, or the spitting of blood in quantities of a dram or more, especially when occurring in persons under 40 years of age, is presumptive evidence of tuberculosis.

*Hoarseness and Huskiness*—Hoarseness and huskiness when persistent should always be investigated as to origin. Laryngeal tuberculosis is a frequent cause.

*Loss of Weight*—Loss of weight amounting to 5 per cent or more of the usual weight within a period of three or four months and not accounted for by seasonal variation warrants a careful examination for tuberculosis.

*Fever*—Elevation of temperature to more than 99° F. occurring at a certain time of the day for several days should be regarded as abnormal temperature and warrants the suggestion of tuberculosis. It should be borne in mind that temperatures as high as 99.6° F. may occur after exercise, after meals, or during the menstrual period. The temperature during the period of investigation should be taken every two hours, over a period of at least a week.

*Rapid Pulse*—When the pulse is taken after half an hour of physical and mental rest, a pulse rate in men exceeding 90 per minute, and in women, 95 per minute may be one of the early signs of tuberculosis.

*Indigestion* — Loss of appetite, "finicky" appetite, or what the patient terms "dyspepsia" or "indigestion" is a common early symptom of tuberculosis, and is especially significant when occurring in young people.

*Examination Procedure*—Any one of these symptoms should prompt the patient to seek medical advice. None of them is pathognomonic. A careful history should, of course, be made, followed by a thorough physical examination, microscopic examination of the sputum, and in most cases, roentgen examination. Exposure to tuberculosis, especially if it has been intimate or prolonged, is suggestive as adding to the probability of the diagnosis.

A careful physical examination, especially of the chest, is essential. It is not necessary here to discuss in detail physical examination procedures, but it may be emphasized that râles or moisture heard over the upper part of the lungs are almost diagnostic of tuberculosis. However, the disease may give rise to no physical signs. An examination indicating the chest to be normal, therefore, does not exclude the presence of tuberculosis. It is now recognized that the proper taking of roentgenograms, preferably stereoscopic, is an essential procedure in the examination of the chest. Definite parenchymal changes are seen in nearly all instances of proved pulmonary tuberculosis. Absence of such changes demands other proof of the existence of the disease.

*Diagnosis*—The diagnosis of tuberculosis cannot, however, be reduced to a formula. After all possible evidence has been collected, it must be evaluated, which requires judgment based on experience and on a visualization of the disease. Guesswork may be materially reduced, however, by examining the collected evidence in the light of certain "key" symptoms. These are the so-called five diagnostic criteria of pulmonary tuberculosis, and are as follows: (1) a history of the spitting of a dram or more of blood, without any other known cause; (2) a history of an otherwise unexplained pleurisy with effusion (water on the lung); (3) definite physical signs of moisture in the upper half of the lungs; (4) definite evidence of parenchymal changes seen in the roentgenograms, located usually in the upper half of the chest; (5) the demonstration of tubercle bacilli in the sputum.

The first and second of these criteria constitute merely presumptive evidence. The third and fourth, while at times misleading and possibly due to other causes, nevertheless strongly indicate pulmonary tuberculosis. The fifth is practically always conclusive proof of pulmonary tuberculosis.

### Conclusion

I wish to emphasize again the importance of dental consultation in many patients presenting themselves for examination with symptoms that may be due to focal infection as well as the benefits that may result from proper dental attention for the tuberculous patient throughout the course of treatment of the disease.

Shonghum Mountain Sanatorium.

## ABOUT OUR CONTRIBUTORS

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Harold S. Hatch, M.D. (University of Vermont, 1914) has been a frequent contributor to the medical literature. He is a member of the American Medical Association and component societies. From 1917 to 1930, Doctor Hatch was associate in medicine at the University of Indiana; he now specializes in diseases of the chest.

Samuel Glenn Major (D.D.S., 1921, B.S., 1923, University of Pittsburgh; M.D., 1927, Harvard University; M.A., 1929, M.S., 1933, Ph.D., 1934, University of Minnesota) has previously written for The Dental Digest (October, 1932) and has been a frequent contributor to the medical periodical literature. Doctor Major is a member of the Pittsburgh Surgical Society, Allegheny County Medical Society, Odontological Society of Western Pennsylvania, Pittsburgh Academy of Dentistry, and a Fellow of the American Medical Association. Doctor Major's practice is devoted to Surgery.

Robert S. DeWaters and James R. Bell are Doctor Major's co-authors of his article appearing in the present issue of The Dental Digest. Doctor DeWaters has his D.D.S. from the University of Pittsburgh (1926). He is engaged in the practice of exodontia and oral surgery, and is a member of the A. D. A. and the Odontological Society of Western Pennsylvania. From 1932 to 1933 Doctor DeWaters taught a postgraduate course in oral surgery at the University of Pittsburgh.

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# REMOVAL OF BROKEN DENTAL NEEDLES*

S. G. MAJOR, Ph.D., D.D.S., M.D.
R. S. DeWATERS, D.D.S. and J. R. BELL, B.S., M.D.
Pittsburgh

FEW problems in oral surgery present the difficulties and demand the resourcefulness and tact on the part of the operator as does the removal of a needle fragment in the pterygoid area. Although broken needles are of comparatively infrequent occurrence, the oral surgeon encounters them much more often than is generally appreciated. The conscientious operator will inform his patient, or a near relative of the patient, of the fact that a fragment of needle has been broken. It is an unfortunate fact that there are a few operators in the dental profession who attempt to conceal such information from the patient. These operators probably feel that a fragment of steel or platinum in the tissues around the jaws will produce no ill effect. That this is sometimes true is conceded, but complications are apt to arise even years after the needle has been broken.

## COMPLICATIONS

1. *Migration of Needles*—There are several possible complications of retained needle fragments. Much has been said concerning the migration of needles. There is no doubt that sometimes a fragment of needle may move from its original locality. It would seem that such movement would be increased by the movement of muscles during mastication. We have had no actual experience with such a needle entering the wall of a large vessel, although this would seem to be anatomically possible. Another possibility in the case of a migrating needle fragment is that it might enter the temporomandibular joint; however, this is even less probable than the encroachment on a blood vessel. In this case it is conceivable that there would be marked impairment of joint function because of the reaction of the connective tissues around the foreign body.

2. *Nerve Involvement*—A second complication resulting from a retained needle fragment is that of nerve involvement. In the pterygoid region

Fig. 1—Roentgenogram taken with the mouth open in position. The anterior end of the needle lies opposite the anterior margin of the ramus of the mandible.

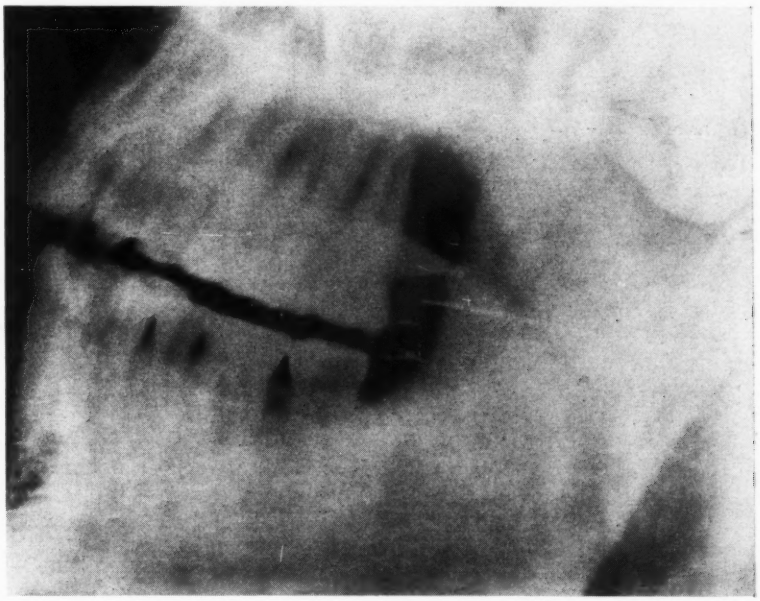

Fig. 2—Roentgenogram showing a long needle fragment. The two rami are correctly superimposed in this exposure, but the jaws are not separated in the proper position for operation. Two wire ligatures are shown (slightly to the left and below the anterior end of the needle fragment) which make the location of the fragment comparatively easy.

*From the Department of Maxillo-Facial Surgery, Western Pennsylvania Hospital, Pittsburgh.

there are two large sensory nerves, the lingual and the mandibular, as well as the motor branch of the inferior division of the fifth cranial nerve. The object of the mandibular injection is to deposit the anesthetic solution in the vicinity of the mandibular nerve. It is probably true that the needle tip usually does not come into actual contact with the nerve itself, but anesthesia is accomplished in the majority of cases by the diffusion of the solution through the tissues into the immediate vicinity of the nerve; however, there can be no doubt that the nerve is sometimes in actual contact with the needle. If the needle is broken in such a circumstance there is definite possibility of the production of neuralgic-like symptoms; these symptoms sometimes persist throughout life unless section of the sensory root is performed. Unfortunately, after such symptoms appear, the needle fragment cannot be removed, owing to a connective tissue reaction about the nerve.

3. *Connective Tissue Reaction*—A third possible complication, and a more frequent one, is a connective tissue reaction around the foreign body. The tissues resent the invasion of a foreign body, and if the foreign body is retained too long, a defensive reaction is produced. This is accomplished by the reaction of the connective tissues; there is a definite trend to encapsulation of the foreign body.

One of us has recently removed a metallic object which had been present for thirty years. In this case there was a well defined cyst, the content of which contained oxidized metallic fragments, and even after this prolonged period, a small piece of metal still remained within the cyst. Nature responds here, as in any regenerative process, by an over-production of tissue elements, and consequently, the connective tissue reaction around a needle fragment is excessive. Such an area of scarring may result in a myositis of the internal pterygoid muscle, with consequent trismus. Here, again, after the myositis has developed little can be done to relieve symptoms thus produced.

4. *Law Suits*—Another complication, which is pertinent although of an entirely different nature, is that of medico-legal proceedings. It is not in the realm of this paper to discuss the sympathetic attitude toward the patient of a lay jury. If the needle has been removed in the interim between the dental operation and the court proceedings the practitioner will have less cause for anxiety than if he has made no attempt to have the fragment removed; or perhaps has not even made the patient aware of its presence, the diagnosis having been made subsequently by roentgenographic examination.

## Mandibular Injections

By far the greatest number of needles are broken during the course of mandibular injections, and since their removal in this region is difficult, and since the general principles of removal of needles in this region apply to needle fragments elsewhere, this paper will be confined to the needle broken during mandibular injections.

## Reasons for Broken Needles

There are several reasons to account for needles breaking during the course of the injection: (1) Some broken needles are due to faulty technique on the part of the operator; (2) some are due to poor cooperation on the part of the patient; and (3) some are due to improper selection of needles or to (4) faulty needles.

There are several reasons to account for needles breaking during the process of a deep injection about the mandibular nerve, among which are: (1) defective needles; (2) the use of a needle of too small caliber; (3) excessive angulation of the needle during the injection; (4) excessive force exerted when the needle tip meets obstruction; (5) lack of knowledge of the anatomy of the region, and (6) poor cooperation on the part of the patient.

*Defective Needles*—With regard to defective needles, no prolonged discussion will be made of the relative merits of steel and platinum needles. The steel needle is perhaps less difficult to manipulate, and the tip can be kept in better condition than one of platinum. The operator should make a definite rule, if he insists on the use of a steel needle, to discard it at regular intervals, and not use the same steel needle over too long a time.

*Selection of Needles*—With regard to the selection of a needle of suitable caliber, it must be borne in mind that if a needle of fine diameter is desired the best choice is a platinum needle. There are steel needles available at the present time which will withstand a marked degree of bending, and if a needle is to be employed, obviously one of this type is preferable to one that will break easily.

*Angulation* — Many operators make the mistake of subjecting the needle to an excessive degree of angulation during the injection. Granted that many needles available can be subjected to repeated bending, and some can even be tied in a knot, nevertheless during any injection the needle should be manipulated from side to side as little as possible.

*Force*—If the needle point meets an obstruction, one should not force the needle beyond the point of obstruction. The needle should be withdrawn part way and inserted at a slightly different angle. Forcibly to attempt to push a steel needle of small caliber beyond a rigid point of obstruction is to court the disaster of a broken needle.

*Anatomy*—The anatomy of the region of the mandibular injection must be clearly visualized by the operator. Medially are the tendinous fibers of the internal pterygoid muscle which offer a definite degree of resistance to the needle; laterally, is the mandibular ramus, the surface of which is never absolutely smooth, and often a sharp-pointed needle engages against a minor bony irregularity. The variance in the anatomy of the region in different persons must be considered. Generally speaking, the bony irregularities are more pronounced in well developed muscular persons than in thin, poorly developed persons.

*Suitable Subjects* — Occasionally the mishap of a broken needle is entirely the fault of the patient. It should be borne in mind that there are certain types of patients not suited to deep nerve injections. The highly apprehensive patient, the "neurotic, high-strung" type, and young children are to be given deep nerve injections only after careful deliberation as to its advisability.

One of us recently had occasion to remove a small needle fragment from the pterygoid region in a child, aged 4 years. This type of anesthesia was probably a poor selection for this particular patient.

The majority of patients are suitable subjects for deep nerve injection. The operator should tell the patient what he is attempting to accomplish. It seems a little far-fetched to the average patient to have an injection in the pterygoid area in order to have a lower anterior tooth extracted; a sudden turn of the head due to the patient's apprehension may be the cause of a broken needle.

*Anesthetic*—The choice of an anesthetic is an important consideration in needle removal, if one is to secure good results in a high percentage of cases. No single agent can be employed in all cases. In the phlegmatic person, who takes the mishap calmly, local anesthesia supplemented by sedatives is often all that is required, and most of these patients can be handled satisfactorily in the office. On the

other hand, in the agitated, apprehensive patient or in the case of children, general anesthesia should be employed, preferably in a hospital. Although ether readily lends itself to this type of case, we prefer avertin as the anesthetic agent. The rectal anesthetic often must be supplemented by a small amount of ether, but the basic averin anesthesia, we believe, is superior to an anesthesia of ether alone.

*Location*—A short history solicited from the patient often aids in locating the needle fragment. It is important to ascertain whether the anesthetic solution had been deposited in the tissues, either in part or entirely, and whether or not anesthesia was procured throughout the distribution of the mandibular nerve. If good anesthesia is secured with a small amount of solution, we can be assured that the needle tip lies above the level of the mandibular foramen and in proximity to the mandibular nerve. If, with the deposition of a fairly large quantity of anesthetic solution, no anesthesia is secured, we can be fairly sure that the needle tip lies in a position incorrect for anesthesia.

*We wish to emphasize strongly that no attempt should be made to plunge into the soft tissues to grasp the end of the needle unless the needle is easily visible above the surface of the mucous membrane.* Instead, a careful roentgenographic examination must be made to locate the position of the needle accurately. This is of paramount importance in needle removal. Ordinarily roentgenograms should be taken with the jaws in the same relationship as they will be during the operation to remove the needle, as shown in Fig. 1. In other words, the roentgenograms should be taken at approximately the same angle as during the operation. A bite block or gag should be employed.

A second point is that some roentgenopaque material should be inserted into the soft tissues so as to serve as a point, or points, of reference of the needle fragment. Some operators employ hypodermic needles for this purpose, but those interfere with working convenience at the time of the operation, and we prefer to insert several wire ligatures, threaded through the soft tissues on a full curved intestinal needle. The ligatures are tied as shown in Fig. 2. These do not interfere with the working conditions and are not removed until the needle fragment is finally extracted. By using several such ligatures the needle may be fairly well located.

Fig. 3—Vertical incision through the mucous membrane. The position of the needle is indicated by the dotted line.

The two rami should be superimposed in the roentgenogram. The object of this is to prevent distortion. The superimposition does not interfere with the view of the needle. If the needle is some distance from the inner surface of the ramus, and the roentgenogram is taken at any angle other than a right angle, the distortion may show the needle to be remote from where it actually is. In most cases, it is well to take roentgenograms at least at one other angle, and sometimes in several positions. If there is any question as to whether the needle was introduced to the lateral side of the anterior border of the ramus an occlusal view should be taken; the needle may actually be shown to have been introduced to the lateral side of the ramus; this is, however, exceedingly rare.

*Time*—Having decided on the choice of an anesthetic agent, and with accurate roentgenograms at hand, the next step in the removal of the needle is to consider the time most suitable for operation. If there has been no attempt by another operator to remove the needle prior to the time we are consulted, we proceed immediately. However, if there has already been considerable mutilation of the tissues of the pterygoid area, we prefer to defer the operation until the inflammation has subsided, which is usually a matter of three or four days.

## Technique for Removal of Needle in Mandibular Area

1. The patient is well anesthetized, either by local or by a general anesthetic, and the mouth is held open at the same angle as when the roentgenograms were taken. By consulting the roentgenograms the approximate location of the needle is visualized.

2. *The incision is planned in such a way that it is at right angles to the long axis of the needle fragment, with about half of the incision above and the other half below the level of the needle, and with the line of incision crossing the needle fragment at about the junction of the anterior and middle thirds of the needle, as shown in Fig. 3. The purpose of making the line of incision in this manner is that the needle will not be pushed deeper into the tissues in a posterior direction by working down upon its anterior end.*

We attempt to strike the side of the needle and not its anterior extremity. It is foolhardy to attempt to locate the anterior end of the needle by dissecting directly down upon it. This vertical incision is made only through the mucous membrane, and no blind incision should be made into the deeper structures of the pterygoid area, because of the possibility of severing the lingual nerve, the mandi-

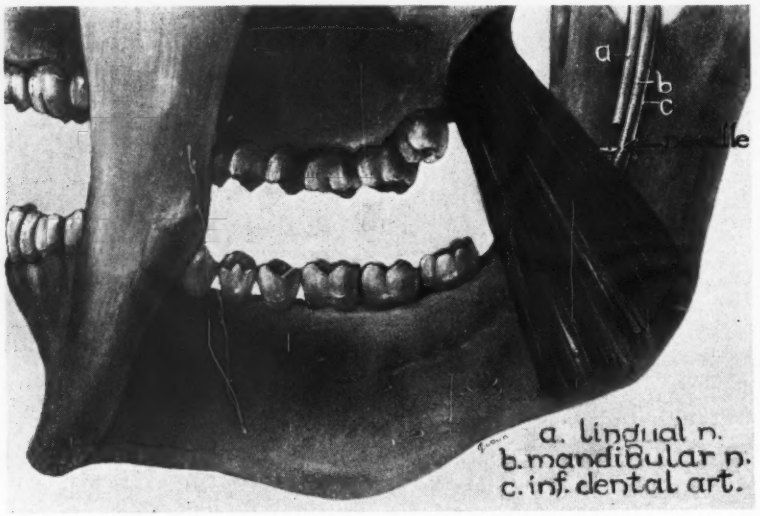


Fig. 4—The relationship is shown of the lingual and the mandibular nerves and of the inferior dental vessels to the internal pterygoid muscle, and the position of the needle fragment in respect to these structures.

bular nerve, or injuring the inferior alveolar vessels above the point where they enter the mandibular foramen. The proximity of these structures to the needle fragment is shown in Fig. 4.

3. The anterior flap of mucous membrane is now grasped with small Allis forceps or is retracted anteriorly with a small retractor, so as to give a view of the field of operation. No crushing instrument, such as a hemostat, should be placed on the mucosal flaps.

4. With the anterior edge of the internal pterygoid muscle exposed the fibers are separated in the direction of its fibers, not cutting the fibers; this is done by blunt dissection, as shown in Fig. 5.

We prefer to do this blunt dissection by placing curved scissors or a hemostat between the fibers of the muscle and then separating the blades gently. In this manner there is less likelihood of lacerating the lingual nerve which passes anterior to the mandibular foramen. The nerve should be pushed aside if it is encountered rather than severed. After the fibers of the muscle have been separated throughout the length of the incision, the anterior fibers are retracted anteriorly by a small blunt retractor and the posterior fibers are held back by the blades of a curved hemostat. Usually at this stage the lingual nerve is visible. The needle is located by the use of a probe.

6. With the probe against the needle, a fine hemostat is placed in the wound beside the probe and the needle is grasped with it. If the needle fragment is short, it is sometimes possible to extract it through the original incision. However, if it is long, a second fine hemostat is placed on the needle, and the needle is worked forward, one hemostat being kept clamped on the needle while the other is released, and vice versa. In this way it is worked forward and eventually its anterior end will produce a prominence in the mucous membrane over the region of the anterior margin of the ramus.

7. The mucous membrane is nicked with a scalpel and the end of the needle pushed out through this opening.

8. A hemostat is then placed on its anterior end, the two original hemostats are released, and the needle is thus removed.

A word of caution is in order in those cases in which the needle has been in place for considerable time. In these cases no angulation of the needle should be attempted, because owing to corrosion, such needles are prone to break into smaller fragments.

### Nerve Suturing

If the lingual or the mandibular nerves have been severed during this operation, an attempt at nerve suture should be made, fine silk being used for this procedure. No attempt is made to suture the separated fibers of

(*Continued on page* 430)


Fig. 5—Method of separating fibers of the internal pterygoid muscle by blunt dissection. A, the lingual nerve; B, the mandibular nerve and inferior dental vessels.

# The Editor's Page

YESTERDAY the seals for the Relief Fund of the American Dental Association came to my office as well as to the offices of all other members of the Association. The day before yesterday a pledge card was received with the request for a contribution to the Community Chest: a worthy project, I am sure. As I read the December numbers of both professional and general publications, I see the appeals to buy Christmas Seals to help in the fight against tuberculosis.

These appeals may strike us in one of two ways: First, our baser selves, our selfish selves, may react in irritation to what we may believe to be a begging, hat-in-hand onslaught upon our pocketbooks from these several sources. In short temper, we may assign the seals and pledge cards to the wastebasket. A richer, finer emotion may, in the second place, be stirred. If we reflect, we may see that the guild spirit, the brotherhood of the craft, is behind the motive of the Association Relief Activities. In the Community Chest, we note the hand of neighborliness at work to help the underprivileged or those in need of a kind of aid that is not supplied from governmental doles. In the anti-tuberculosis campaign is reflected a cooperative movement in public health education that is a credit to the wisdom of the American people.

You and I would like to be good members of the guild, good neighbors, good citizens. We would like to stretch our resources to cover the Relief Fund activities, the Community Chest, the Christmas Seals. We may, however, have to choose among the three. If I must make this choice, I would prefer to support *my guild*; to help the fellow members of the craft to which I am genuinely devoted. By my donation to the American Dental Association Relief Fund, I reflect, I may help some colleague of mine beside whom I have sat in committee deliberation; or perhaps one who is known to me only by the bond of correspondence; or perhaps some dentist, unknown to me at all, who has spent his life with the same ambitions and aspirations as I. Then in selfish light I see myself in need of aid: ill and without resources. Such contemplation sounds like so much sentimentality; but there are certain likely realities which unfortunately can only be described in sentimental terms; the sound of an expression, however, has nothing to do with its truth. I repeat, were I in the plight of illness without resources, I would rather turn for help to my friends and colleagues than to a community fund, or reach out to grasp the cold hand of the dispenser of the dole.

None of us *expects* to be among the unfortunate. We do not *see* ourselves destitute. I have seen the checks go forth to men who once were affluent; men whose food and fuel and shelter could be had only from the fund of the guild. Once I rode in a funeral cortége that did not end in Potter's Field only because a saving check came forth from a relief fund.

In the ten years of existence the Fund has distributed more than $100,000 to indigent members of the Association. The rare judgment and business ability of the custodians of the funds are attested to by the fact that this activity of temporary relief has been carried on from average yearly per capita contributions from the members of about *forty cents*.

President Casto suggests that the contributions this year be made as a gesture of honor to the memory of John H. Cadmus who labored throughout the years as secretary of the Relief Commission. In a letter from John Cadmus to Doctor Fred R. Adams of the Fund, we learn something of the vision of a great man doing an important work well:

"Since the organization of this fund we have prevented nearly one hundred of our members from becoming public charges. We have made their last days on earth comfortable and happy. If every member would give at least a dollar a year we could extend the activity further among our needy members."

I SHALL NOT DELAY: MY CONTRIBUTION GOES FORTH TODAY.

# DISEASES OF ENAMEL:
# TREATMENT BY EXTENSIVE PORCELAIN RESTORATIONS

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THERE are four main types of enamel diseases: mottled, erosion, atrophied, and enamel that is malformed by heredity. Extensive porcelain restorations offer interesting possibilities for treatment in all these types. What these possibilities are and how they may be realized is described here by presenting one case in full detail to illustrate each type.

## Mottled Enamel

Mottled enamel is interesting to the dental practitioner because of its prevalence, and because, in the near future, medical science may entirely wipe out this dental malady.

The case of mottled enamel has been definitely traced to the presence of minute quantities of fluorine in drinking water.[1] The danger line is two parts in a million; in many parts of this country, particularly in some of the Rocky Mountain districts, the water supplies have been found to contain from two to seventeen parts of fluorine in a million. In fact the drinking water is so bad in some of the endemic areas that in one town in Colorado investigations showed that 98 per cent of the population had mottled enamel teeth. Mottled enamel is also commonly seen among the mountainous sections of Italy. In fact, some people in this country from those areas recognize their fellow countrymen by this disfigurement of the teeth.

Fortunately mottled enamel may be prevented by changing the water supplies so that the water is free of fluorine. This is being done already. Cities are investigating their water supplies and changing to fluorine-free water sources.[2] It is gratifying, too, that the process by which fluorine produces mottled enamel in the teeth is now being closely investigated, and the nature of its action is clearly understood by research workers.[3] It is, therefore, not too visionary to hope that in the near future medicine will find a treatment to check mottled enamel as soon as it is discovered, and possibly even to restore the enamel to healthy appearance and structure.

There are many varieties of mottled enamel, and it occurs in all degrees of severity. Mottled enamel may run in mild forms in which the tooth is patchy, opaque, and unglazed, to severe cases in which the whole tooth is mottled; also, it may vary from mild instances in which only several of the teeth (usually the uppers) are affected, to more severe cases in which every tooth in the mouth is mottled.

## Report of Case of Mottled Enamel

A young man, in his thirties, was physically normal but had mottled teeth. The entire dentition was unsightly, which was a source of embarrassment to the patient. The teeth were developed to normal size and form, but badly mottled (Fig. 1). Though some small cavities were present in the centrals, laterals, and cuspids, these teeth were not badly decayed.

It is interesting to observe that the reason this young man came in for dental attention was because a cyst had developed on the palate. He had no idea that dentistry could do anything to correct the mottled teeth.

While working on the removal of the cyst, I studied the patient's dentition for the possibility of its correction with porcelain jackets. Most of the teeth were well-formed, of sound structure (except for the discoloration of the enamel), and would, therefore, bear up well under porcelain crowns. The patient was physically in good condition to endure the extensive preparation.

Roentgenologic and clinical diagnosis was made first. The upper right cuspid had a cyst at the apex of the root, which developed into an acute alveolar abscess on the right side of the palate, almost covering that entire half side of the palate. The abscess was incised and drained, the cyst removed, and the tooth extracted (Figs. 2 and 3).

The roentgenograms also indicated the necessity to extract several of the upper and lower teeth (these teeth are marked by arrows in Figs. 2 and 4) which were abscessed or so broken down that it was found advisable to replace them with bridgework.

The following restorations were therefore made before preparation of the jacket was begun: replacement of the upper right cuspid which was extracted as a result of the cyst and the upper left first bicuspid, which was missing. To do this the upper right first and second bicuspids were covered with gold crowns, the first bicuspids carrying a small bridge; a Steele's interchangeable facing was used to fill the cuspid space (Fig. 3). A large cavity in the upper right second molar, which almost covered the entire occlusal surface, was anatomically restored.

On the left side, the upper left first bicuspid was missing, and the upper left second molar, found to be abscessed, was extracted. It will be noted in Fig. 2 that the space between the upper left cuspid and second bicuspid is large. This was, I believe, a result of an early extraction combined with the loss of a first permanent molar. The second bicuspid consequently had plenty of room to drift toward the second molar.

All cavities were restored with amalgam. It was also found necessary to remove the lower left second bicuspid and first molar, and those were replaced by a fixed bridge.

The preparation of the jackets was then begun, starting with an upper left lateral, and then proceeding with the left central, right lateral, and right cuspid, in the order named. The porcelain crowns were also applied to the lower centrals, laterals and cuspids (Figs. 5 and 6).

My first thought was to carry the porcelain crowns as far back as the first molar in order to conceal entirely the mottled disfigurement. To use jackets farther back than the cuspids, however, would give only slight additional esthetic effect which the cost would not justify.

When the porcelain jacket crowns were completed, the result was a complete transformation, not only of the patient's dentition, but of his whole personality (Fig. 7). He gained 18 pounds within two months after the restorations were completed.

These porcelain jacket crowns were put on three years ago. They have since stood up without any difficulty. The restoration, therefore, comes up to expectations in every way, and by its results amply justifies the labor and expense involved.

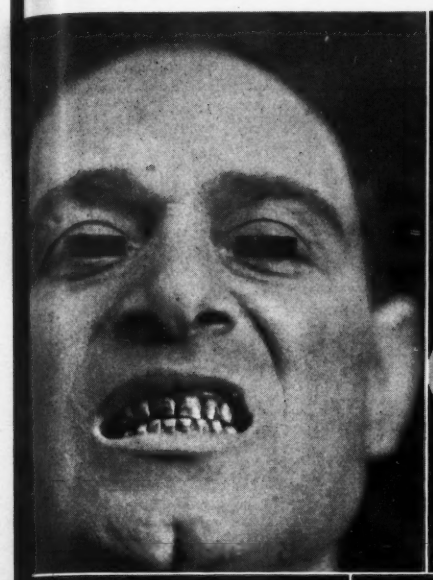
## Erosion

The causes of erosion are as yet imperfectly understood. Research investigation of erosion has not been

[1] McKay, F. S.: Mottled Enamel: The Prevention of Its Further Production Through a Change of the Water Supply at Oakley, Idaho. J. A. D. A. 20:1137 (July) 1933. Smith, Margaret C.; Lantz, Edith M., and Smith, H. V.: Causes of Mottled Enamel, Tech. Bul. No. 32, University of Arizona, June 10, 1932. Smith, Margaret C.: Mottled Enamel in Arizona and Its Correlation With Water Supplies, Tech. Bul. No. 43, University of Arizona, July 15, 1932.

[2] Churchill, H. V.: Occurrence of Fluorides in Some Waters of the United States, J. Dent. Research 12:141-148 (February) 1912. The two cities already reported to have changed to fluorine-free water sources are Oakley, Idaho and a city in Arizona.

[3] Velu, H.: Possibility of Fluorine Intoxication During Fetal Life, With Special Consideration of Dystrophy of Teeth, Bul. Acad. de Med., Paris, 110:799 (December 26) 1933. Boissevain, C. H. and Drea, W. F.: Spectroscopic Determination of Fluorine in Teeth, J. Dent. Research 13:495-500 (December) 1933.



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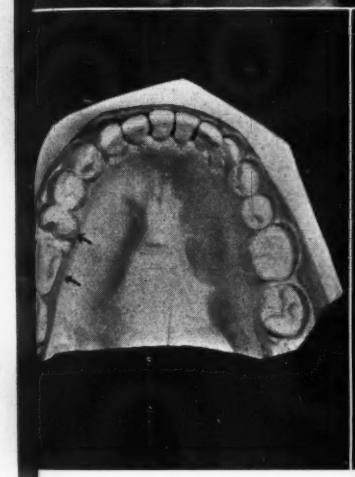

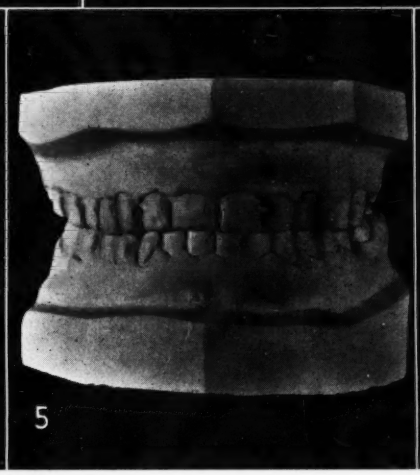

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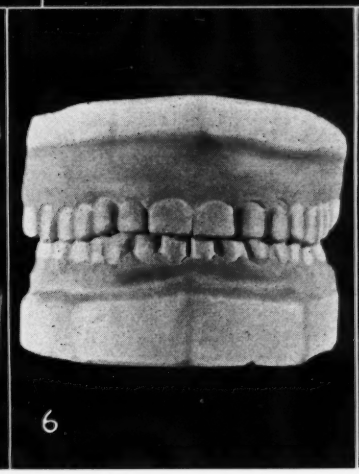

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Fig. 1—Appearance of patient before treatment. Note the badly mottled appearance of all the teeth.

Fig. 2—Model of uppers before work was begun. Note the cyst arising from right cuspid. Arrows point to teeth that had to be removed. Note also large space between cuspid and second bicuspid.

Fig. 3—Models, both upper and lowers, of completed work (inside view).

Fig. 4—Models of lower jaw. Arrows indicate teeth that had to be extracted.

Fig. 5—Models showing entire dentition before work was begun.

Fig. 6—Models showing completed work. Compare with Fig. 5.

Fig. 7—Agreeable appearance of patient with completed restoration. Compare with Fig. 1.

extensive. Strong indications are already present, however, particularly from the work of Doctor Miller who produced erosion artificially outside of the mouth, that it is due to acids in the mouth.

As with mottled enamel, there are many forms of erosion and all degrees of severity. One severe case of erosion is reported here:

The patient, a middle-aged man, in excellent physical condition, had poor teeth as a result of erosion. The erosion was so severe that it occurred not only in the susceptible areas (at the cervical region of the tooth) but extended far down from the cervix on both the labial and lingual sides. On some teeth, the erosion even extended directly down, in a straight line, to the incisal edge on both the mesial and distal sides of the tooth. Unfortunately, only two teeth are shown in Fig. 8.

This patient's teeth were unusually long, and as a result of the erosion anomaly, the gums receded, making the teeth appear all the more elongated. The resulting unsightliness embarrassed the patient in his occupation of sales executive.

The patient had tried every measure that dental science offered in the hope that some transformation of the teeth to normal could be realized. He had had them restored with synthetic and amalgams; inlays of various types had also been tried.

*Treatment* — Roentgenographic examination of the entire dentition disclosed that all the upper teeth, with the exception of the upper right lateral, were vital and free from apical infection. The upper right lateral was found to be abscessed and was therefore extracted.

All the teeth were prepared for porcelain jacket crowns.

A local anesthetic was used throughout.

The porcelain jacket crown was first placed over the upper right first bicuspid. A thimble crown was constructed on the cuspid; the lateral was supplied with a Trupontic. The two upper centrals (Fig. 9) were next restored with porcelain jackets.

While proceeding with this work a new technique of strengthening porcelain was introduced. The upper left cuspid was restored with a porcelain crown (Swann Type) as the abutment for a porcelain bridge; the first bicuspid was a full porcelain pontic.

As this pontic was to serve as a support for a removable partial restoration (Fig. 10), it was important that this tooth be properly contoured and closely abutted against the ridge.

*Technique*—After the Swann bridge was made, I placed some wax over the ridge and in fitting the bridge, pressed it firmly into the wax. The bridge was then reinvested; the necessary porcelain added to make it conform to the wax impression, then reglazed and finished. This I found adapted the bridge more closely to the gums, made it fit more securely, and gave it sufficient support to carry the

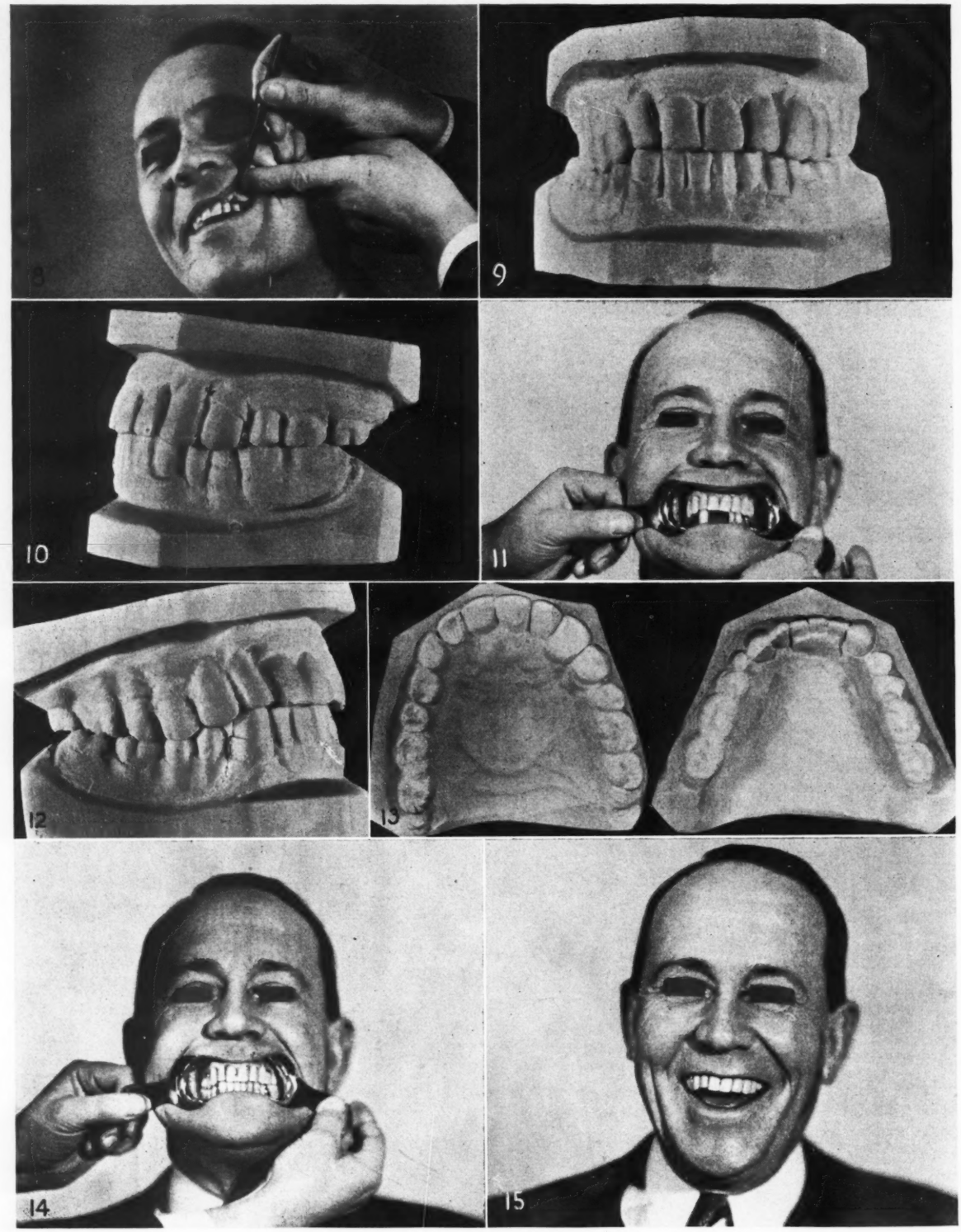


Fig. 8—Pencil points to extensive erosion on cervixes of upper left lateral and cuspid.
Fig. 9—Models of completed restoration.
Fig. 10—Models (left side view) showing completed Swann bridge (on upper left cuspid) of which the first bicuspid serves as the abutment for a partial (clasp) denture restoration for the remaining upper teeth.
Fig. 11—Appearance of patient with upper restoration completed.
Fig. 12—Models of completed work (right side view).
Fig. 13—Models of completed restoration (inside view). Note, on the model of the uppers, the close adaptation of the porcelain jackets, and the particularly good adaptation of the Swann bridge, which makes it possible to use the second left bicuspid as the clasp abutment to support a removable restoration. The model of the lower teeth shows the remaining right (jacketed) bicuspid and first left bicuspid (with previous gold crown) which were made the clasp abutments of a case with lingual bar.
Fig. 14—View of patient with work completed.
Fig. 15—Natural, attractive, appearance of patient with restoration completed.

burden of the clasp-partial-restoration that was supported on it (Figs. 10 and 11).

A partial upper denture was constructed. In the lower jaw, several loose teeth were extracted. The right cuspid was jacketed, and a partial, lingual bar denture with two clasps was made.

## Atrophied Enamel

Atrophy of the enamel is a hypoplasia of the tooth as a result of the acute exanthema of childhood.

As is the case of mottled enamel and erosion, atrophy occurs in many forms and in all degrees of severity.

A girl, aged 15, had pronounced atrophy of the centrals, laterals, and part of the cuspids. The first permanent molars were also badly atrophied.

In childhood, the patient had had a severe case of scarlet fever with high temperature. As a result of this the first permanent molars, the upper centrals, laterals, and also the lower centrals, laterals, and cuspids were atrophied. The upper centrals and laterals were affected more than the corresponding lower teeth (Fig. 15), probably because of a somewhat later eruption. Note the normal development of the bicuspid and molars in Fig. 16.

A thorough roentgenographic and clinical examination showed that all the teeth were vital and free from pathologic defects. Considering the nature of the condition, the possibility of restoration with fillings was out of the question. The incisal edges were completely destroyed; retention would therefore be impossible. Gold inlays might have been used, but covering a full half of each tooth with gold would not be attractive. I therefore felt it advisable to use porcelain crowns.

The lower centrals, laterals, and cuspids also had small cavities, and the labial surfaces were somewhat eroded. These I was able to restore with plastic porcelain and then I filed and smoothed the eroded areas. This was all the lowers needed to make them presentable.

Crowning all the six upper anteriors was sufficient for the present. The first permanent molars were left to be restored at some later date. Figs. 17 and 18 show the completely satisfactory transformation which resulted. These crowns have now been on for more than two years, and in that time have presented no difficulty.

## Malformed Enamel by Heredity

A case of enamel malformation as result of heredity was described in the first article[4] of this series. Full particulars of its treatment are given there.

Defective teeth caused by heredity are being frequently reported in the literature.[5]

## Conclusion

There are many persons hideously disfigured by teeth with diseased enamel. The condition is embarrassing, and as a result, persons with mottled enamel live a parched, withered social life.

It is the function of the dentist, I feel, to treat teeth for the relief of social maladjustments just as much as it is his duty to treat teeth for the relief of their pathologic defects. The mental agonies endured by people who cannot show their teeth because disfigured by diseased enamel becomes a physical malady. Mental agonies penetrate to the physical being and cause ailments there.

Something must be done for those people suffering from the disfigurement of diseased enamel. The new method of extensive restoration with porcelain crowns described in these articles is in my opinion the answer to the problem.

The porcelain crown does possess features which make it well suited for diseased enamel restorations: It produces in full the natural beauty of a sound, healthy tooth; it seals the tooth completely, checking any possibility of further deterioration; if properly applied (with a broad flat shoulder), it considerably strengthens the tooth structure. Extensive restorations with porcelain crowns, therefore, offer a permanent restorative treatment for diseased enamel teeth.

*This article is not an attempt to make the exaggerated claim that extensive porcelain restoration is a full cure for all diseased enamel teeth.* Only in some, a fraction of the many cases of diseased enamel, is the extensive restoration with porcelain *possible;* in far fewer cases still is it *advisable.*

But in those cases in which it is advisable, and those are mostly the severe ones, in which the disfigurement, and hence the need for transformation is greatest—in those cases extensive porcelain restorations offer excellent possibilities for treatment that permanently restores the teeth.

Fig. 16—Appearance of patient before restoration. Note how badly the upper anteriors are atrophied, while the lower anteriors are not so badly affected.

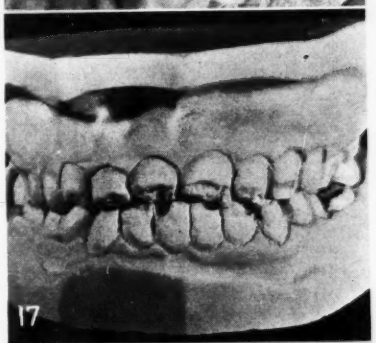

Fig. 17—Models before restoration.

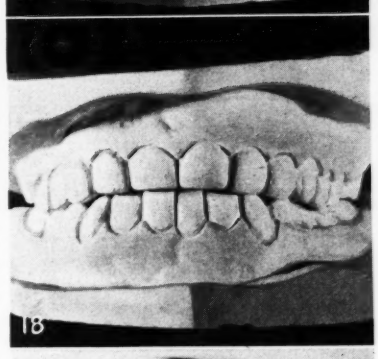

Fig. 18—Models of completed work in case of atrophied enamel.

Fig. 19—Completed restoration, showing changed appearance of patient in case of atrophied enamel.

[4] Kazis, Harry: Extensive Porcelain Jacket Restorations, DENTAL DIGEST 40:298 (September) 1934.

[5] Clark, H. F. and Clark C. S.: Absence of Tooth Enamel; Dominant Hereditary Anomaly in Man, J. Heredity 24:425 (November) 1933. Kley, H.: Familial Occurrence of Hypoplasia, Med. Welt. 8:311 (March 3) 1934.

678 Massachusetts Avenue.

# SECURING RETENTION IN LOWER FULL DENTURES

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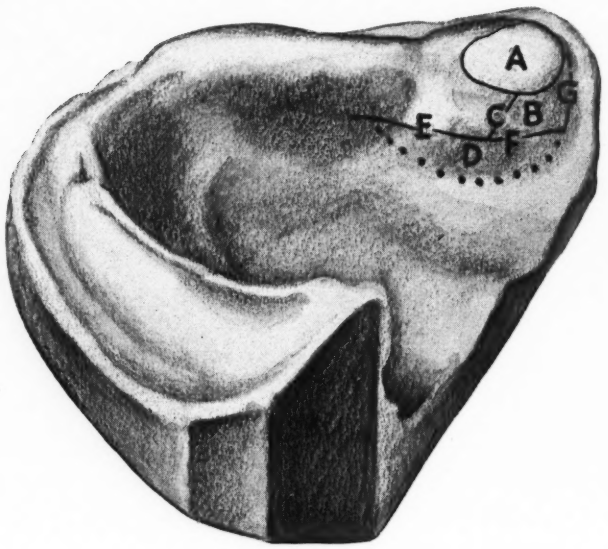
THE full lower denture will always remain a mystery to all who follow denture builders who advise using identical technique for upper and lower dentures. The only thing in common the two alveolar processes have is their tooth bearing purpose but their foundations are as different as bed-rock and quicksand.

The dental profession has successfully coped with the problem of the upper denture. Dentists can, almost at will, impart any degree of retention they wish to these upper dentures, but this cannot be said for lower dentures.

Some knowledge of anatomy of the part where most retention can be secured must be had. I am, therefore, calling attention to a diagrammatic representation of what one sees and palpates in the region of the lingual heels of lower plates. Fig. 1, A shows, surmounting the distal end of the alveolar crest, a pear-shaped thickened pad. Slightly below this, running directly downward and slightly forward, is a raised or rounded internal ridge (Fig. 1, C). It is up to this ridge that most lower dentures are brought and finished. Directly distal to this ridge and in the direction of the tonsils, lies a depressed area (Fig. 1, B). In 80 per cent of the cases I have seen, this area is free of muscular and ligament attachments. The horizontal line is that of the mylohyoid ridge.

The lower margin of this area is determined by extending backward the general line of the mylohyoid ridge (Fig. 1, F). The mylohyoid ridge is the orthodox lower border of all lower dentures wherever made. Below this area lies a deeper depressed area in which tongue and throat muscles arise (Fig. 1, D). The encroachment on this particular area by pioneer denture builders has caused them to drop the use of the whole extension in disgust. By fixing the diagram in mind, it is not necessary to make the same mistake.

This area lying back of the raised internal ridge and above the mylohyoid ridge with its mate on the opposite side forms a natural undercut. This undercut must be handled gently. When handled gently, satisfaction with the denture results. When a lower denture is constructed according to the following technique, keeping what has been said in mind, it usually takes no more than four adjustments, and sometimes only two, to let the patient go on his way, to enjoy his food.




**A.** PEAR-SHAPED THICKENED PAD.
**B.** AREA HAVING NO MUSCULAR OR OTHER ATTACHMENTS.
**C.** RAISED OR ROUNDED INTERNAL RIDGE LINE.
**D.** DEEPER DEPRESSED AREA IN WHICH TONGUE MUSCLE AND THROAT MUSCLE INSERTIONS ARISE.
**E.** LINE OF MYLOHYOID RIDGE.
**F.** EXTENTION OF MYLOHYOID RIDGE LINE TO IMPRESSION LIMITS.
**G.** LINE FROM EXTREME DISTO-ALVEOLAR BORDER OF PEAR-SHAPED PAD TO EXTREME LIMIT OF EXTENDED MYLOHYOID RIDGE. THIS MARKS LINGUO-DISTAL PLATE LIMIT.

Fig. 1—Anatomic landmarks in an edentulous mandible.

## Technique

1. A snap impression is taken with any linguo-distal extension lower tray on the market, or with one of the Bowen split and hinge trays. The latter are the most satisfactory. The operator should try to get the area directly back toward the tonsils.

2. A model is poured in plain plaster and the case outlined as shown in Fig. 2. To outline a case, one

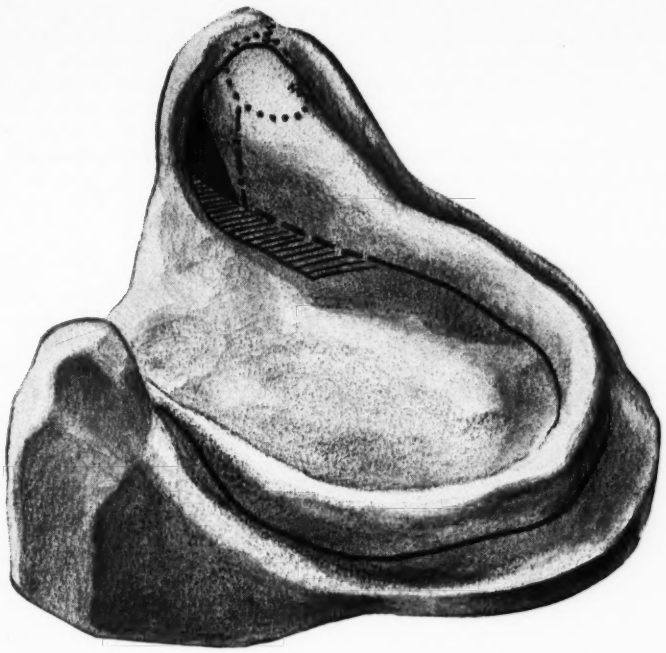



Fig. 2—Outline form of full lower denture.

must first locate the anatomic areas. The pear-shaped area is outlined first; the raised internal ridge is then marked; followed by the outline of the mylohyoid ridge; this mylohyoid ridge line is extended backward to impression limits. The denture outline is made by connecting the extreme impression limit of the extended mylohyoid ridge line to the distal alveolar crest border of the pear-shaped area. The denture outline is carried over to the buccal surface by having it bisect the pear-shaped area that faces buccally. The remainder of the denture outline, not shown in the figures, is outlined as in the days before modeling compound corrected impressions were popular. These outlines were shy rather than over-extended, thus avoiding muscle attachments.

3. Two layers of the resinous base-plate material are fitted one over the other. These are adapted to the outlined model and their borders are carefully made to coincide with the outline. Carefully polish the united border with a rasp and make sure that the two layers are securely united to each other by hot wax being placed between them or by forcing the edge of a hot spatula through the outer layer, uniting it with the inner one by the softened material. The double thickness is necessary to overcome the fragility of this material and carry the "finished impression" better.

4. The base-plate tray is fitted in the mouth. The patient is instructed to protrude the tongue. If the patient complains of the tongue being tied down, the extended area is filed off on the side in line with the mylohyoid ridge until relief is secured. The operator should not file off from the extreme distal border. The remainder of the lower tray is now corrected. If by raising the tongue and having it touch the roof of the mouth the tray is dislodged, file generally around the lingual border, but do not touch the area just adjusted. The labial border is treated in a similar manner, the tray margin being kept well away from muscle attachments. This tray represents the outline of the finished denture after the adjustments have been made.

5. A piece of red base-plate wax, one-eighth inch by one-half inch is softened, rolled, and added just within one extreme lingual edge of the tray. While the attached wax is still soft, the tray is introduced into the mouth, the waxed side going in first. It is held seated long enough to chill the wax, which is about one minute. The same procedure is repeated on the opposite side, the softened wax side going in first again.

6. A test for mechanical retention is now made. Try to raise the tray heels by tilting the tray in the central incisor region. A handle to aid in tilting may be made of wax and attached in the incisor region. *If it will not raise at all, there is too much compression. If it raises readily and comes completely away more wax must be added. If it raises slightly, then stops, and if when the pressure is continued for a moment more, it comes away, the retention is exactly right.*

7. Truplastic, plastogum, or similar material is now used for the final impression. A thin mixture is made and placed in the tray. Portions of the material are also carried into the mouth, covering the labial portion of the ridge. Some of the material is placed on both sides between the tongue and where the disto-lingual border of the denture will be. The resinous base-plate is carried to the mouth and seated, and the whole mass is allowed to set. The patient is instructed to repeat the tongue movements and work the lips while the impression is still soft but firmly held in place. The removal is done in an upward and backward direction. The impression should be boxed and poured in any good stone. Plenty of room should be provided for thick heels.

8. From this point on, the operator may use his usual technique for setting up teeth. There is a secure

foundation. It should be remembered that the original resinous base is the denture outline, especially so in the heels of the impression.

9. In adjustment of the finished denture for tongue soreness or relief, always trim the bottom edge upward; never trim away the whole extension at the same time. The denture should only be trimmed forward from its extreme distal position when an electric lighted mirror exploration definitely shows this edge to be creating the soreness.

10. The extension portion should be slightly polished on the gums or alveolar surface, and the margins should be well rounded. This polish may be secured by placing a heavy or medium tin foil over the extension area before packing and vulcanization. Waxing must be fairly thick on the heels, and the excess taken down when the denture is finished.

206 Mills Building.

## REMOVAL OF BROKEN DENTAL NEEDLES

(*Continued from page* 422)

the internal pterygoid muscle, and the only ligature used is two or three interrupted sutures placed in the mucous membrane flaps. Number 1 chromic catgut is used for this ligature. We do not place a drain in the wound, since it has been our experience that these wounds close with no complication other than slight to moderate trismus for the first few days following the operation. The sutures do not require removal. Ordinary mouth hygiene is instituted following the procedure.

COMMENT

We wish to emphasize that no attempt should be made to remove a needle fragment unless the operator is thoroughly familiar with the anatomy of the region, and unless he is prepared to spend the time required for the operative procedure. Occasionally a needle may be removed in a few minutes, whereas a case that may appear parallel in every respect requires an hour or more before the foreign body is finally located and removed.

6109-6111 Jenkins Arcade Building.

## AN OUTLINE OF DENTAL HISTORY

SOME form of dentistry seems to have been practiced in ancient Egypt, Greece and Rome. The following names and dates marked significant strides in the progress of dental science:

460-370. B.C.: Hippocrates: Extracted teeth and advised cleaning and preserving with a powder of his own formula.

25 A.D.: Aurelius Cornelius Celsus: Physician and writer who stressed in his treatise of eight books, *De Medicina,* the pathology and therapy of the teeth in connection with the practice of general medicine.

15th Century: Johannes Arculanus: An Italian dentist who strongly introduced conservative treatment of badly decayed teeth. He was the first dentist to use gold as a restorative material.

1613-1684: Highmore: Discovered that the supermaxillary bone is hollow, and this cavity was named for him antrum of Highmore.

1632-1723: Leeuwenhoek: Threw light on histology and bacteriology with improved microscope.

1680-1761: Pierre Fauchard: Wrote *Le Chirurgien Dentiste ou Traite des Dents* in 1728 which laid the foundation on which modern dentistry stands today.

1776: Puff: Made the first plaster model, and pin teeth from oyster shells in Germany.

1776: Duchateau: A German chemist; first to make artificial teeth from ivory.

1781: Le Maire: Introduced dentistry in the United States.

1788: Greenwood: Established himself as the first dental practitioner in New York.

1802: Benjamin Rush: Wrote a letter to Doctor Edward Miller pointing out the close relationship between diseased teeth and general diseases.[1]

1829: Koecher: By his *Principles of Dental Surgery,* published in London, established dentistry as a science.

1837: Murphy: Made the first attempt in Ireland to prevent decay. The restorative materials used then were silverplate, cement and guttapercha.

1840: The first dental college was established at Baltimore.

1842: Leir Gilbert: Made the first real plaster cast in Shonovan.

1844: Wells: Discovered nitrous oxide anesthesia.

1845: Francis Rynd: Applied the hypodermic injection in Ireland.

1846: Morton: Discovered ether anesthesia.

1848: Caouchouc was invented. Goodyear made vulcanite rubber. Puttman made the first pot for vulcanizing in New York.

1866: Bertham: Cast the first aluminum plate in Baltimore.

1871: G. V. Black: Invented the first dental engine.

1875: The Royal College of Dental Surgeons was established in Toronto.

1886: Gergman: Introduced steam sterilization in surgery.

1895: Roentgen: Discovered the roentgen rays (x-rays) in Munich.

19th Century: Gardette: Made ivory teeth and gold plates and invented the articulator.

1905: Einhorn: Discovered novocaine.

1907: Taggart: First to use cast gold inlay.

1912: Hunter: Described focal infection.

—M. B. Morpurgo, D.D.S., *Saskatoon, Saskatchewan, Canada.*

[1] Rush, Benjamin: An Account of Several Cases of General Diseases Cured by the Extraction of Decayed and Diseased Teeth, reproduced from the Medical Repository 6:285, 1803, reproduced in THE DENTAL DIGEST 39:358 (September) 1933.

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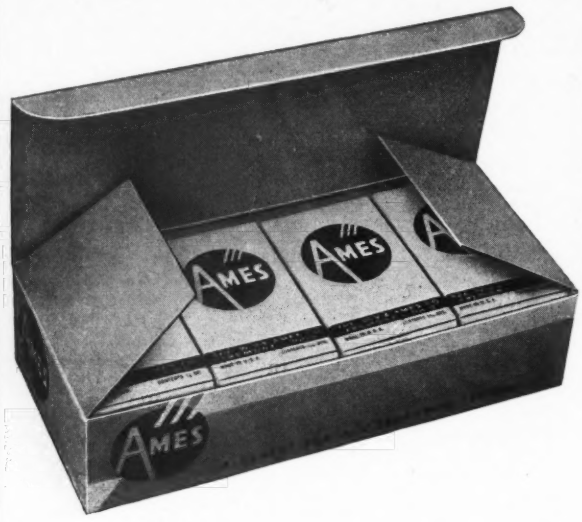


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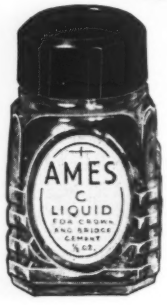


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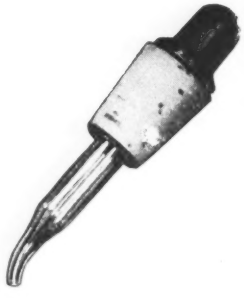

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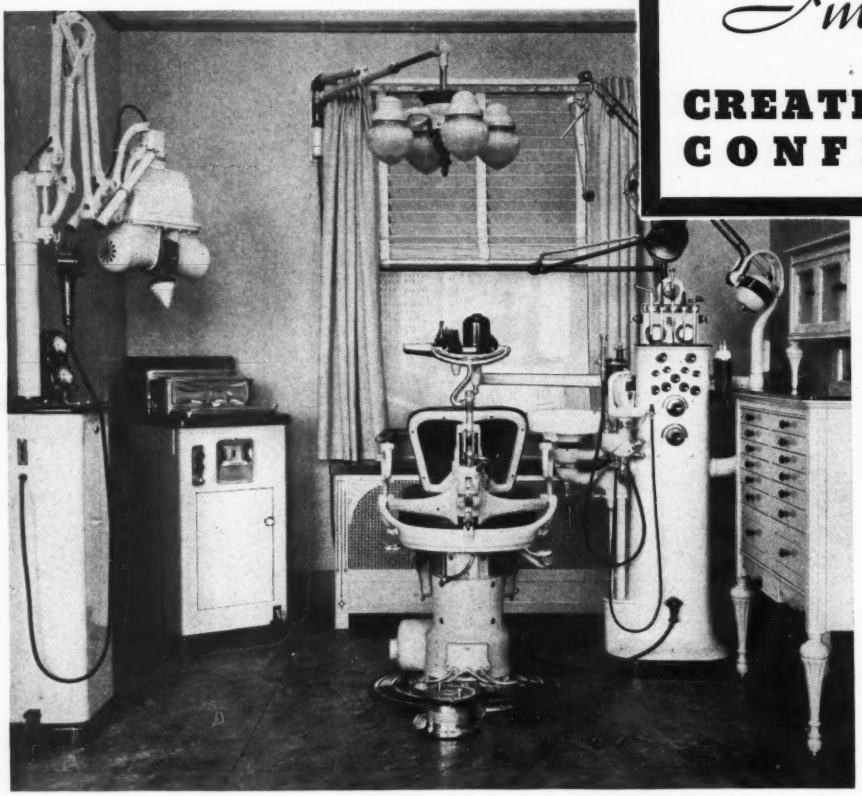

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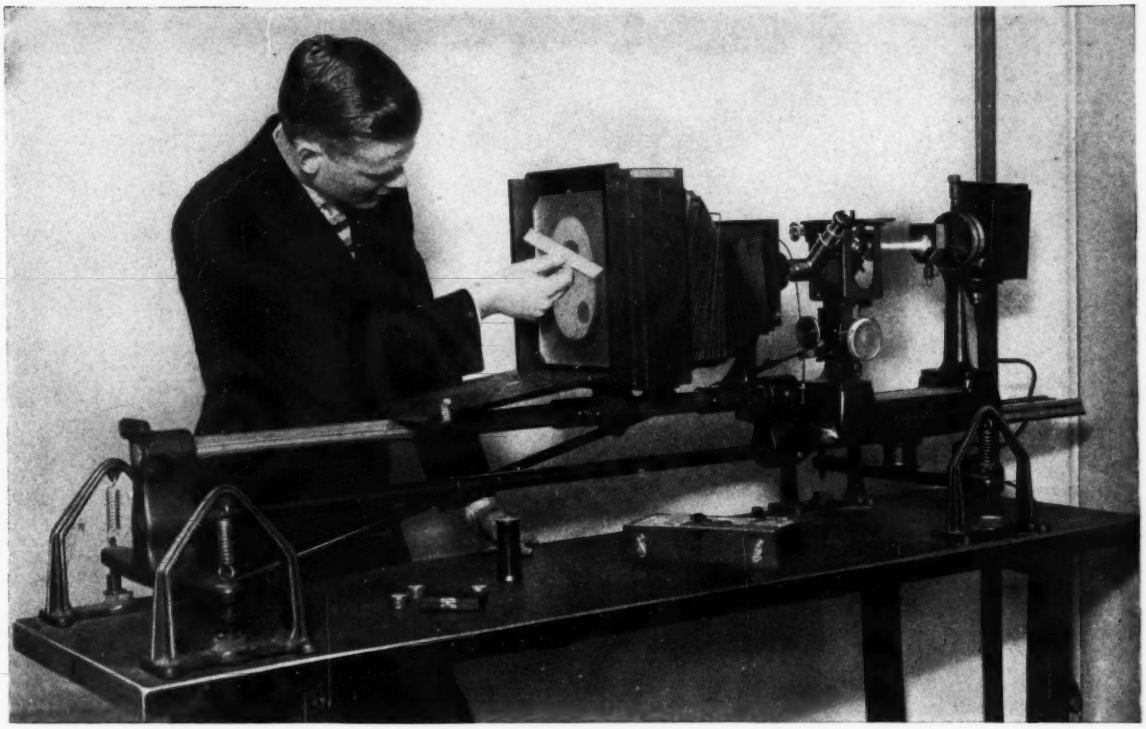

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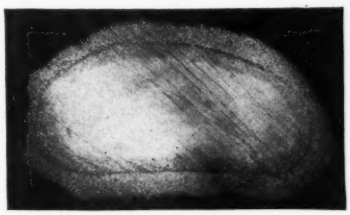

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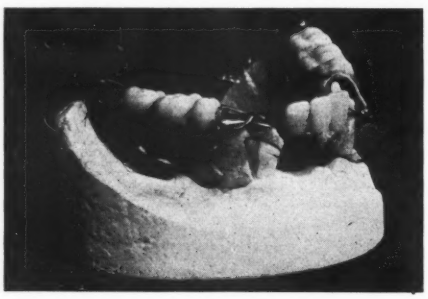

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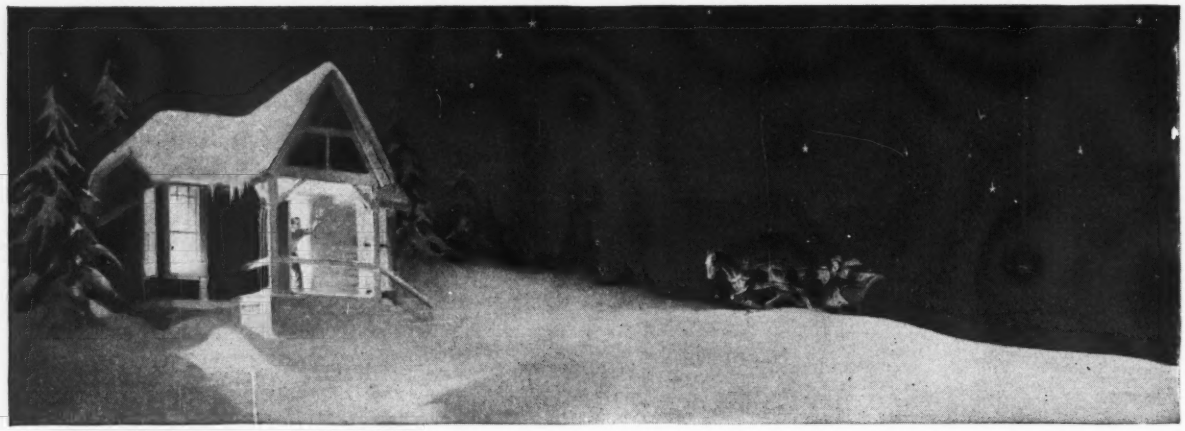

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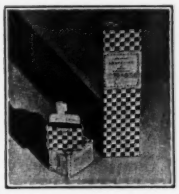

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### *The Tonic, Astringent Action*

Every user of Astring-o-sol notices a pronounced tingling, tonic effect on the mouth and gum tissues. This is due to the astringent and tonic properties of the ingredients—zinc chloride, myrrh and oil of wintergreen.

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**Have your patients form the healthful habit of purging the mouth night and morning with the concentrated mouthwash, Astring-o-sol.**

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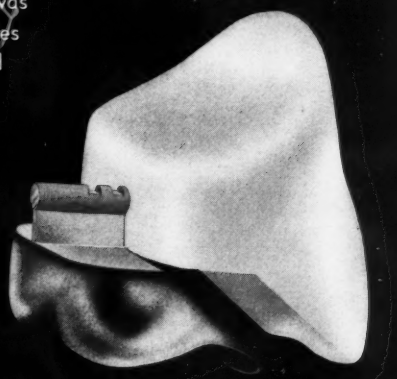


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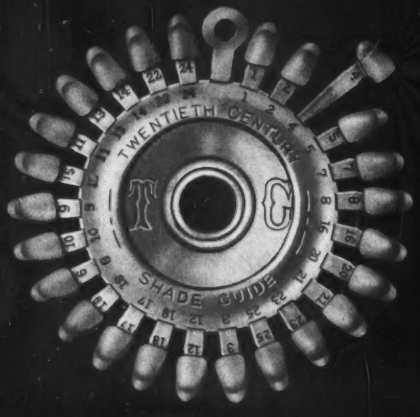


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